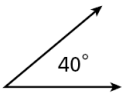
Geometry 4-2 Classifying Triangles (pp 224-229)

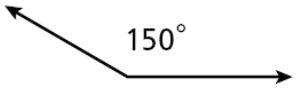
<u>Attendance Problems</u>. Classify each angle as acute, obtuse, or right.

1.

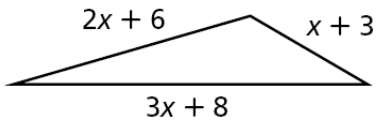
2.



3.



4. If the perimeter is 47, find x and the lengths of the three sides.

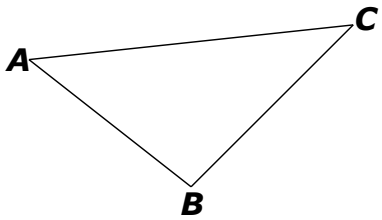


- I can classify triangles by their angle measures and side lengths.
- I can use triangle classification to find angle measures and side lengths.

Vocabulary		
acute triangle	equiangular triangle	right triangle
obtuse triangle	equilateral triangle	isosceles triangle
scalene triangle		

CC.9-12.G.CO.10 Prove theorems about triangles.

Recall that a *triangle* ($\triangle$) is a polygon with three sides. Triangles can be classified in two ways: by their angle measures or by their side lengths.



$\overline{AB}, \overline{BC}, \overline{AC}$ are the sides of $\triangle ABC$.

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A, B, C are the triangles vertices.

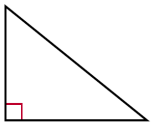
Triangle Classification By Angle Measures

Acute Triangle

Three acute angles

Triangle Classification By Angle Measures

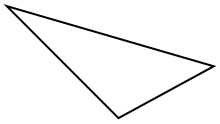
Right Triangle



One right angle

Triangle Classification By Angle Measures

Obtuse Triangle

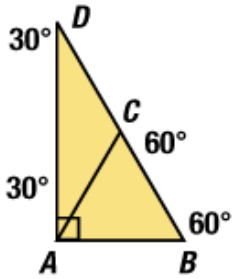


One obtuse angle

<u>Video Example 1</u>. Classify each triangle by its angle measure.

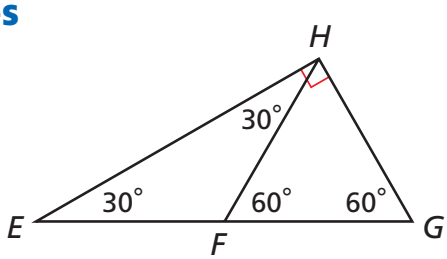
A. $\triangle ACB$

B. $\triangle ACD$



1 Classifying Triangles by Angle Measures

Classify each triangle by its angle measures.



A $\triangle EHG$

$\angle EHG$ is a right angle. So $\triangle EHG$ is a right triangle.

B $\triangle EFH$

$\angle EFH$ and $\angle HFG$ form a linear pair, so they are supplementary. Therefore $m\angle EFH + m\angle HFG = 180°$. By substitution, $m\angle EFH + 60° = 180°$. So $m\angle EFH = 120°$. $\triangle EFH$ is an obtuse triangle by definition.

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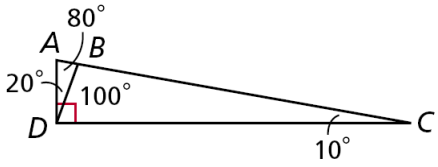
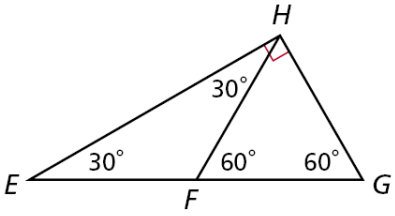
Example 1. Classify each triangle by its angle measure.

A. $\triangle BDC$

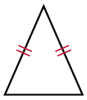
B. $\triangle ABD$

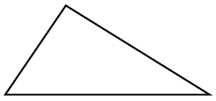


5. Guided Practice. Classify $\triangle FHG$ by its angle measure.



Triangle Classification By Side Lengths
Equilateral Triangle  Three congruent sides

Triangle Classification By Side Lengths
Isosceles Triangle  At least two congruent sides

Triangle Classification By Side Lengths
Scalene Triangle  No congruent sides

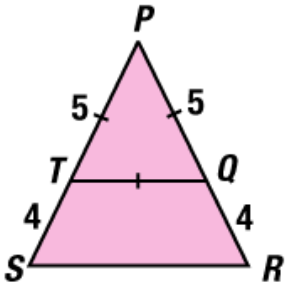
Remember!

When you look at a figure, you cannot assume segments are congruent based on appearance. They must be marked as congruent.

Video Example 2. Classify each triangle by its side lengths.

A. $\triangle TPQ$

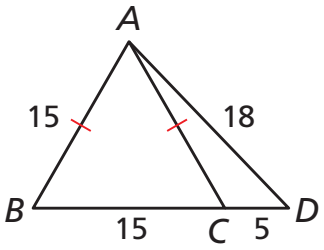
B. $\triangle SPR$



Geometry 4-2 Classifying Triangles (pp 224-229)

2 Classifying Triangles by Side Lengths

Classify each triangle by its side lengths.



A $\triangle ABC$

From the figure, $\overline{AB} \cong \overline{AC}$. So $AC = 15$, and $\triangle ABC$ is equilateral.

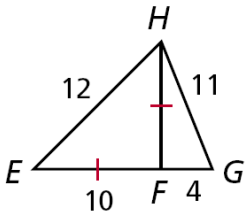
B $\triangle ABD$

By the Segment Addition Postulate,
$BD = BC + CD = 15 + 5 = 20$.
Since no sides are congruent, $\triangle ABD$ is scalene.

Example 2. Classify each triangle by its side lengths.

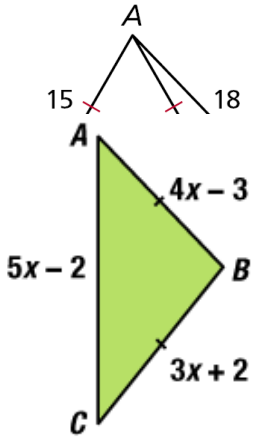
A. $\triangle EHF$

B. $\triangle EHG$



6. Guided Practice. $\triangle ACD$

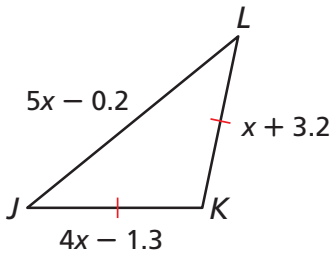
Video Example 3. Find the side lengths of $\triangle JKL$.



Geometry 4-2 Classifying Triangles (pp 224-229)

3 Using Triangle Classification

Find the side lengths of the triangle.



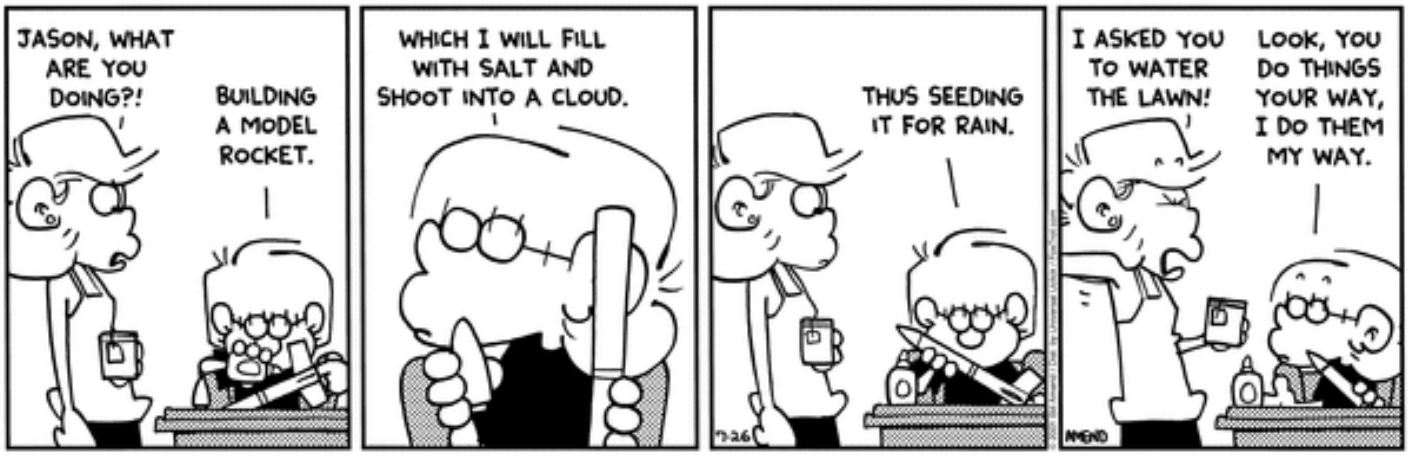
Step 1 Find the value of x.

$\overline{JK} \cong \overline{KL}$	*Given*
$JK = KL$	*Def. of ≅ segs.*
$(4x - 1.3) = (x + 3.2)$	*Substitute (4x − 13) for JK and (x + 3.2) for KL.*
$3x = 4.5$	*Add 1.3 and subtract x from both sides.*
$x = 1.5$	*Divide both sides by 3.*

Step 2 Substitute 1.5 into the expressions to find the side lengths.

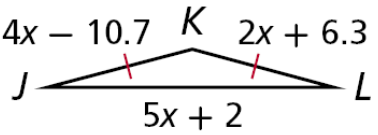
$$\begin{aligned} JK &= 4x - 1.3 \\ &= 4(1.5) - 1.3 = 4.7 \\ KL &= x + 3.2 \\ &= (1.5) + 3.2 = 4.7 \\ JL &= 5x - 0.2 \\ &= 5(1.5) - 0.2 = 7.3 \end{aligned}$$

Q: What do you call a tall kettle on the stove?
A: Hypotenuse!

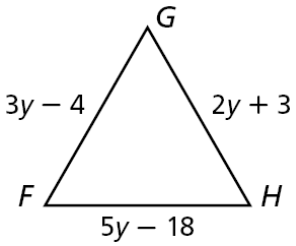


Geometry 4-2 Classifying Triangles (pp 224-229)

Example 3. Find the side lengths of $\triangle JKL$.



7. Guided Practice. Find the side lengths of equilateral $\triangle FGH$.



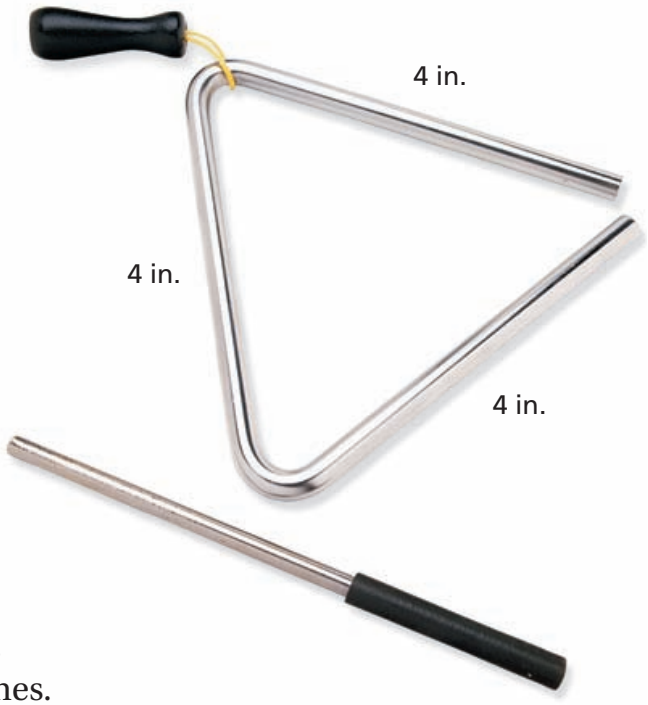
4-2 Classifying Triangles *(p 227)* 13, 14, 15, 17, 19, 20.

Video Example 4. A manufacturer produces musical triangles by bending pieces of steel into the shape of an equilateral triangle. Each side of a triangle is 3 inches long. How many triangle can be formed from an 80 inch piece of steel?

Geometry 4-2 Classifying Triangles (pp 224-229)

4 *Music Application*

A manufacturer produces musical triangles by bending pieces of steel into the shape of an equilateral triangle. The triangles are available in side lengths of 4 inches, 7 inches, and 10 inches. How many 4-inch triangles can the manufacturer produce from a 100 inch piece of steel?



The amount of steel needed to make one triangle is equal to the perimeter P of the equilateral triangle.

$$P = 3(4)$$
$$= 12 \text{ in.}$$

To find the number of triangles that can be made from 100 inches. of steel, divide 100 by the amount of steel needed for one triangle.

$$100 \div 12 = 8\frac{1}{3} \text{ triangles}$$

There is not enough steel to complete a ninth triangle. So the manufacturer can make 8 triangles from a 100 in. piece of steel.

Example 4. A steel mill produces roof supports by welding pieces of steel beams into equilateral triangles. Each side of the triangle is 18 feet long. How many triangles can be formed from 420 feet of steel beam?

Geometry 4-2 Classifying Triangles (pp 224-229)

Guided Practice.

8. Each measure is the side length of an equilateral triangle. Determine how many 7 in. triangles can be formed from a 100 in. piece of steel.

9. Each measure is the side length of an equilateral triangle. Determine how many 10 in. triangles can be formed from a 100 in. piece of steel.

4-2 Classifying Triangles *(p 227)* 13, 14, 15, 17, 19, 20, 21, 22, 24, 28.